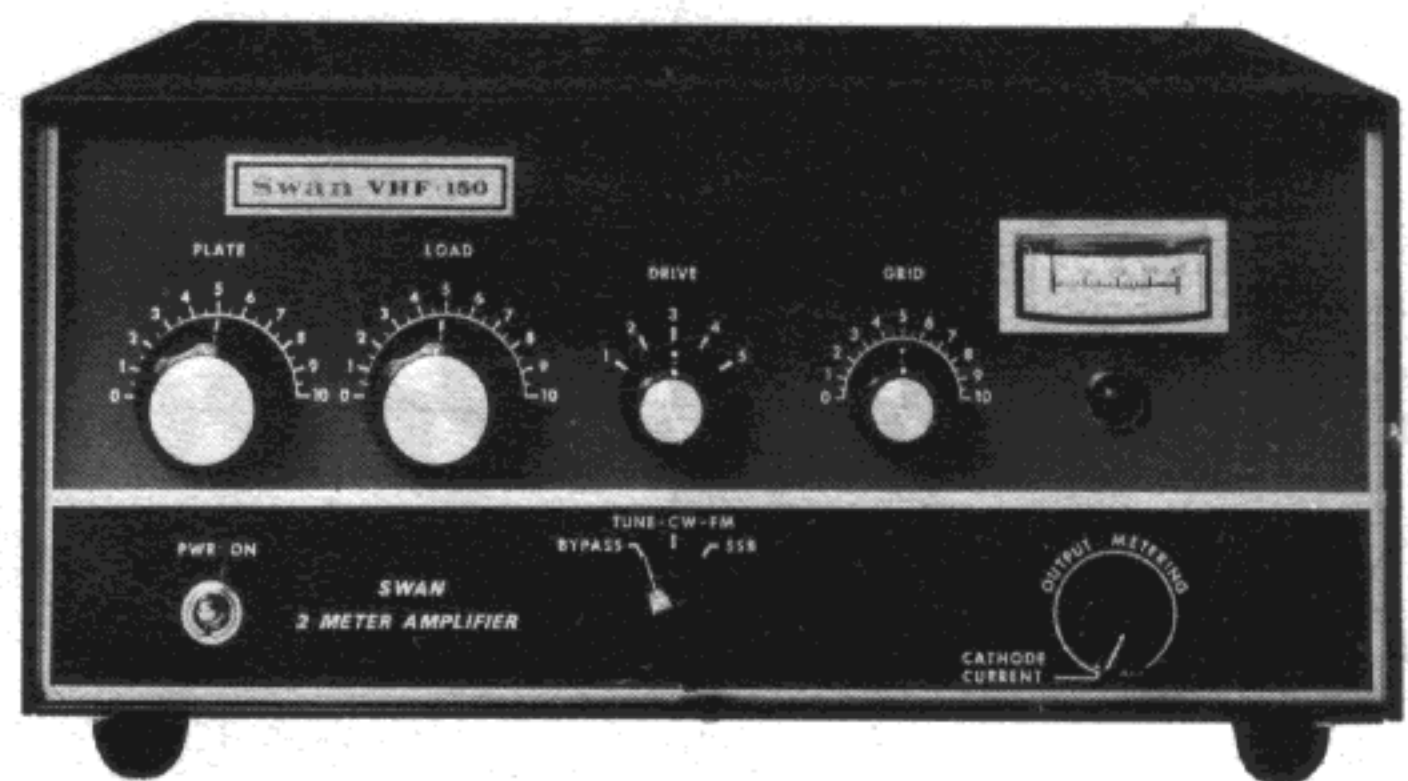


OPERATION AND MAINTENANCE



SWAN MODEL VHF-150

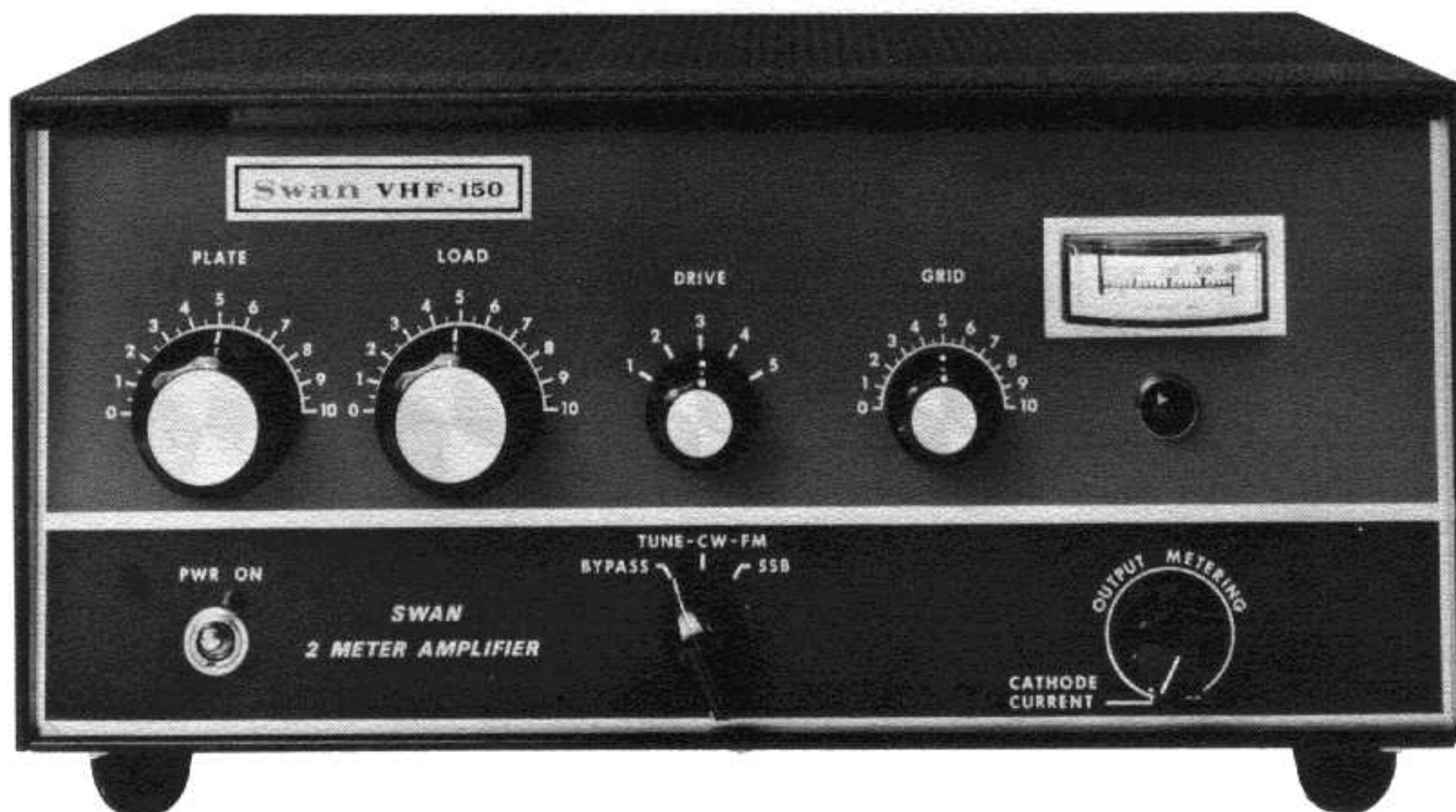
 **SWAN**
ELECTRONICS
Oceanside, California
A Subsidiary of Cubic Corporation

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SPECIFICATIONS

POWER RATING

240 watts P.E.P. input in SSB mode. 150 watts DC input in CW or FM.

FREQUENCY RANGE

143 – 149 MHz

TUBES

1 – 5894B

DRIVE REQUIREMENTS

6 to 10 watts

METERING

Cathode Current 0-400 ma. and Relative Output

DIMENSIONS

13" wide X 5-3/4" high X 10-3/4" deep

WEIGHT

23 pounds

POWER SUPPLY

Self contained, 117 VAC, 50-60 Hertz. Silicon rectifiers, Computer grade electrolytic capacitors, 100 mfd. filtering at 1050 VDC rating.

230 volt, 50-60 Hertz model available on special order.

Mobile operation on 12 volt DC with Swan Model 14C Converter accessory

Output coupling: Tuned link

Transmit-Receive relay control for operation with transceiver

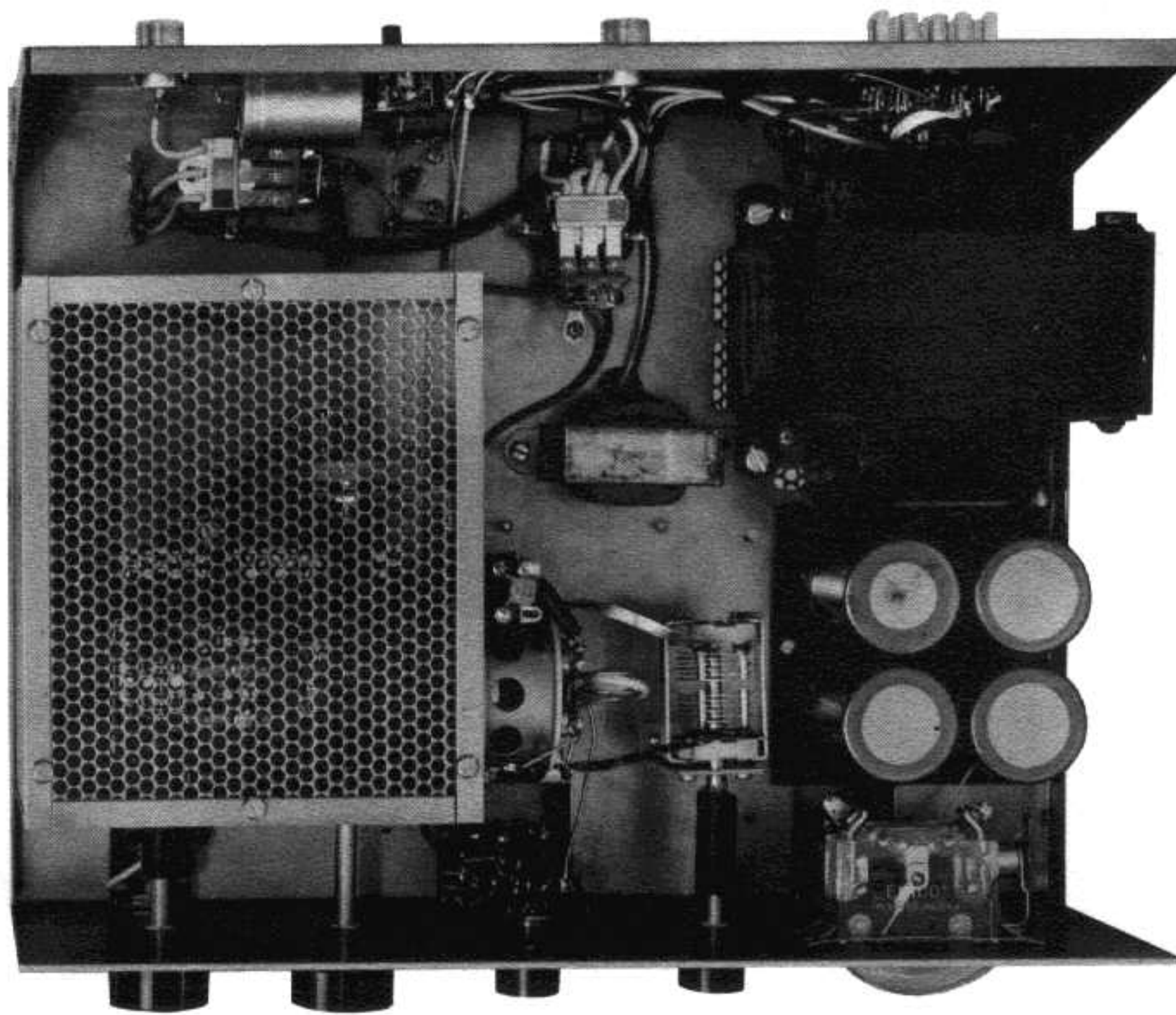


FIG. 1 – VHF-150 AMPLIFIER, TOP VIEW

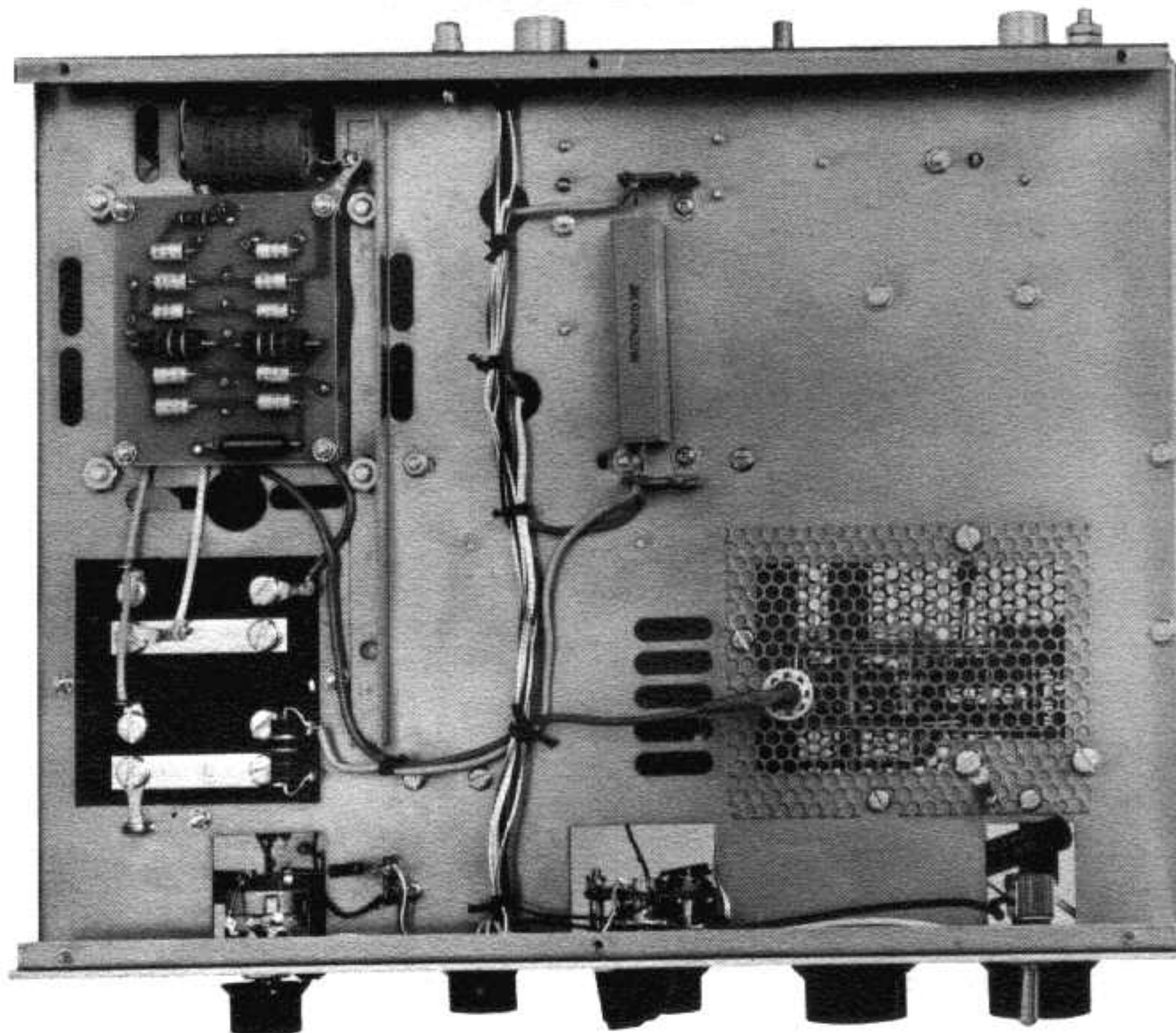


FIG. 2 – VHF-150 AMPLIFIER, BOTTOM VIEW

INTRODUCTION

The Swan Model VHF-150 Amplifier is designed for use on the 2 meter amateur band in either CW/FM or SSB modes of operation. The frequency range of the amplifier is 143 to 149 MHz. The amplifier may be operated fixed or portable, and with the addition of the Swan model 14C DC converter, may be operated mobile. The amplifier is biased Class C for CW/FM operation, and Class AB2 for

SSB operation. With a drive input of 6 to 10 watts, power input to the final exceeds 240 watts P.E.P. in SSB, and 150 watts DC in CW/FM. AC input to the power supply is 117 volts, 50-60 Hertz. A 230 VAC 50-60 Hertz model is available on special order. Provision has been made for Transmit-Receive relay control operation with a transceiver.

INSTALLATION

GENERAL

Although the VHF-150 was designed specifically for use with the Swan FM-2X transceiver, it can be used with any other 2 meter exciter or transceiver, as long as the input to the VHF-150 does not exceed 12 watts. For the following discussion of installation, the Swan FM-2X was used as the transceiver.

FIXED OR PORTABLE OPERATION

Refer to the pictorial in Figure 3 when making the installation. Connect a short length of coaxial cable (RG58U or RG8U) from the output of the FM-2X transceiver to the INPUT connector on the rear of the VHF-150. A PL-259 type connector is required at the amplifier end of the cable. This cable should be as short as practical and preferably not more than 5 feet in length. Connect the relay control cable from the auxiliary relay jack on the rear of the FM-2X transceiver to the relay control jack on the rear of the VHF-150. Connect the antenna coaxial cable or dummy load to the OUTPUT connector on the rear of the VHF-150. If a filter is to be installed, connect it between the OUTPUT connector and the antenna.

MOBILE OPERATION

Refer to Figure 4 when making the installation. Connect a short length of coaxial cable (RG58U or RG8U) from the output of the FM-2X transceiver to the INPUT connector on the rear of the VHF-150. A PL-259 type connector is required at the amplifier end of the cable. This cable should be as short as practical and preferably not more than 5 feet in length. Remove the 117 volt AC supply from the FM-2X transceiver. Modify the 12 volt DC power cord supplied with the FM-2X, by connecting a two conductor cable (24 AWG stranded parallel cable or equivalent) to the two top pins of the plug (the pins having no wires already soldered to them). (See Figure 4.) Connect a phono plug on the other end. Plug the FM-2X power cord into the rear of the FM-2X. Connect the relay control cable into the relay control jack on the rear of the VHF-150. Install the Swan Model 14C DC converter to the rear of the VHF-150 using the 8-32 screw provided. Connect the VHF-150 to a 12 volt DC power source as shown in Figure 4. Connect the antenna coaxial cable to the OUTPUT connector on the rear of the VHF-150.

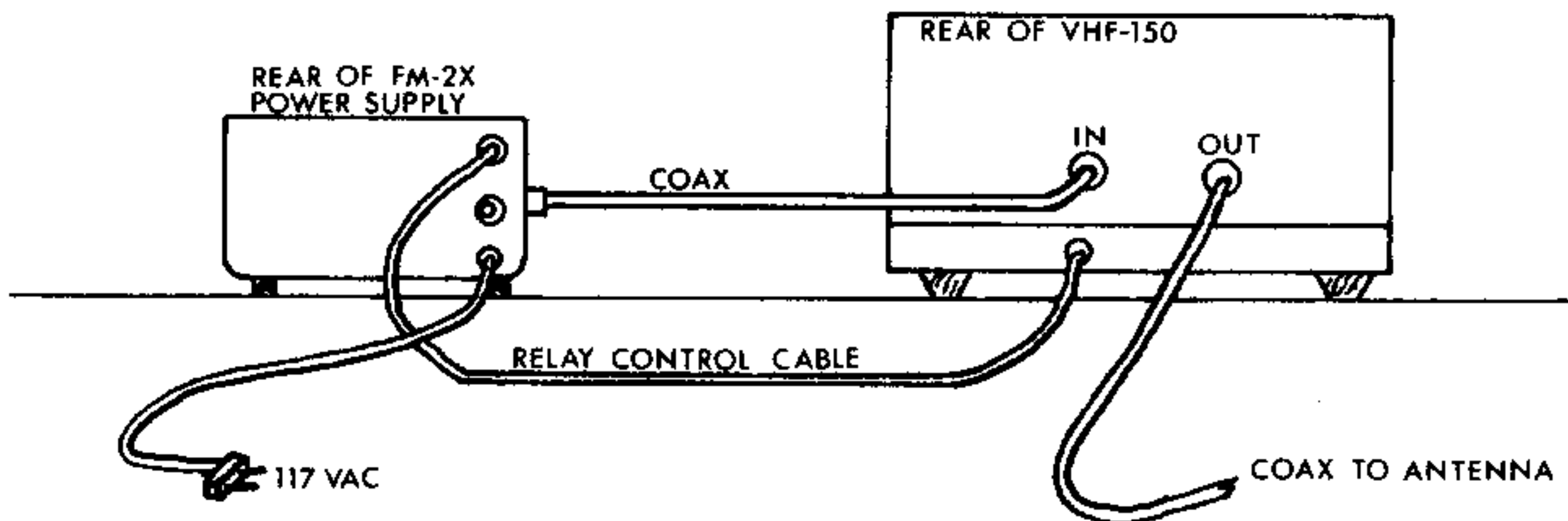
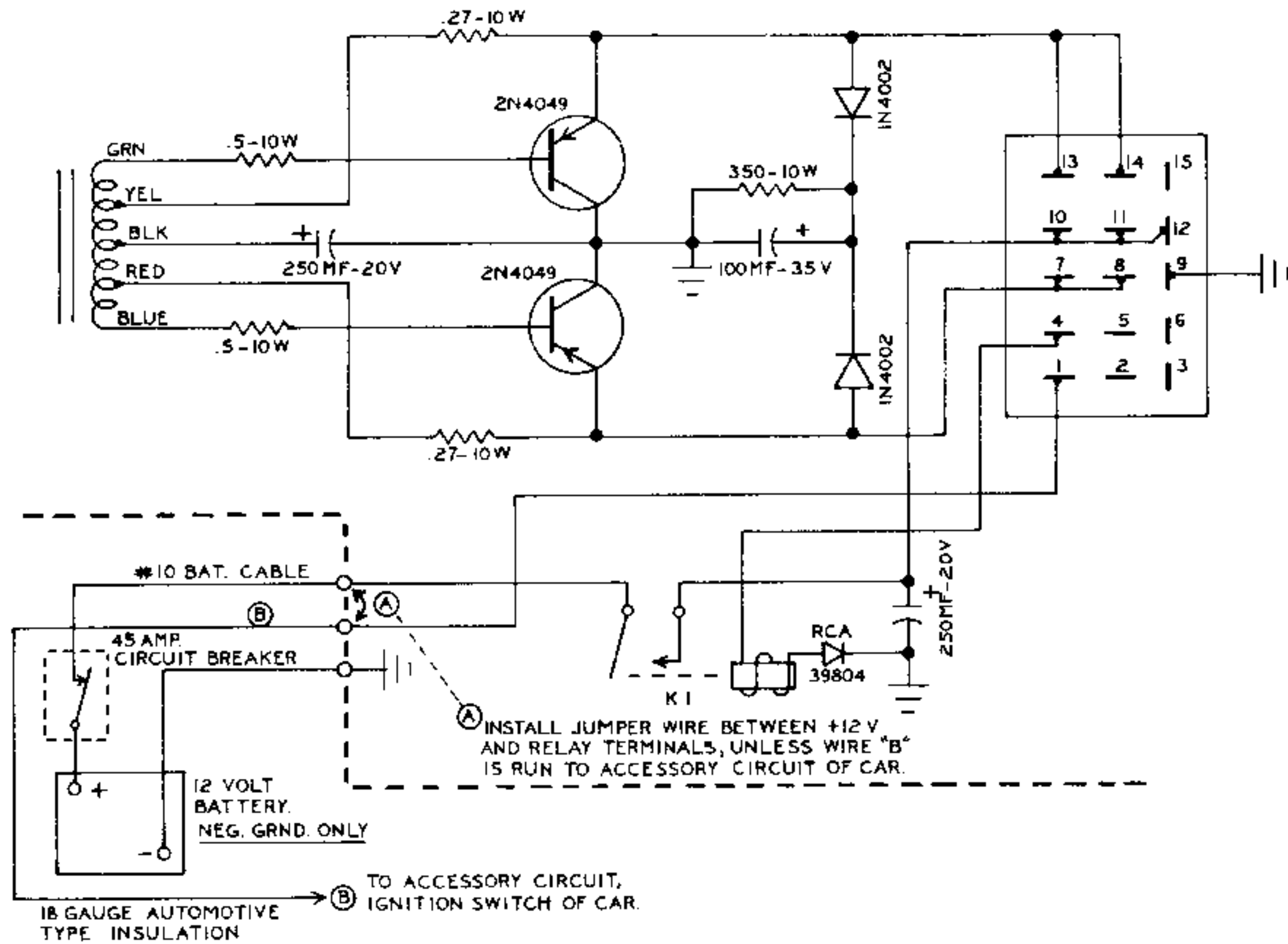


FIG. 3 — TYPICAL FIXED/PORTABLE INSTALLATION USING SWAN FM-2X



SWAN MODEL 14C DC CONVERTER

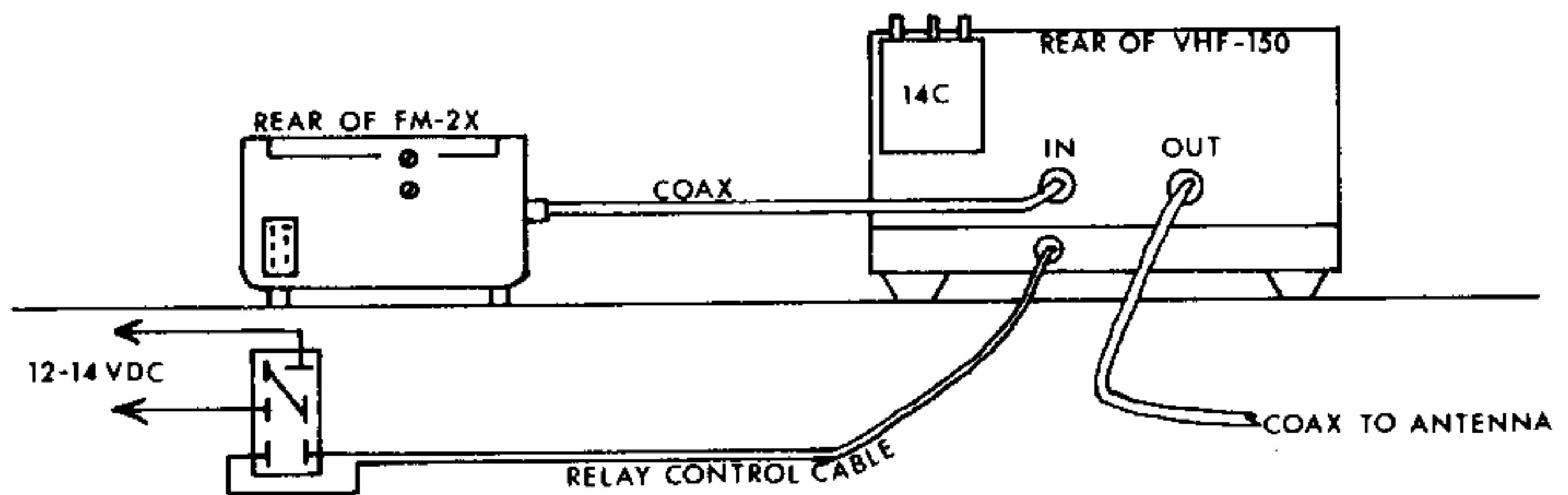


FIG. 4 – TYPICAL MOBILE INSTALLATION USING SWAN FM-2X

TRANSCEIVERS OTHER THAN SWAN

For transceivers other than Swan, refer to the VHF-150 schematic, Figure 5, for the necessary connections to the relay circuit.

CONTROL FUNCTIONS, FRONT PANEL

PLATE

Resonates the amplifier plate circuit (Minimum capacity at 0, Maximum capacity at 10).

LOAD

Adjust loading of amplifier into the antenna (minimum capacity at 0, Maximum capacity at 10).

DRIVE

Adjust drive level into grid circuit of amplifier. Maximum drive at 1, minimum drive at 5. Do not exceed 12 watts at the input connector on rear of amplifier.

GRID

Resonates grid or input tuned circuit of amplifier.

NOTE

WITH POWER SWITCH IN "OFF" POSITION, THE FM-2X OPERATES "BAREFOOT", DIRECTLY THROUGH TO THE ANTENNA.

PWR ON

Turns on power to amplifier.

BYPASS TUNE-CW-FM SSB

BYPASS — No screen voltage applied to 5894B amplifier tube. Antenna relays will not operate. Cutoff bias applied to grids of 5894B. Transceiver operates "BARE-FOOT" through the amplifier without having to disconnect the transceiver from the amplifier.

TUNE-CW-FM — Screen voltage and bias applied to 5894B tube. Antenna relays operate normally;

SSB — Applies proper bias to 5894B for linear operation of amplifier.

CATHODE CURRENT — OUTPUT METERING

In CATHODE CURRENT position, (Counterclockwise until switch snaps), meter reads cathode current 0-400 ma. Rotation of switch clockwise places meter in the RELATIVE OUTPUT circuit. The more clockwise the switch is rotated, the greater the reading of the meter.

CONTROL FUNCTIONS, REAR PANEL

POWER CONNECTOR

15 pin power connector. 117 VAC or 230 VAC power cord plugs into connector. For 12-14 volt DC operation, the Swan model 14C DC converter attaches to the connector.

RELAY CONTROL

Phono jack — Relay control cable from transceiver or exciter plugs into jack.

INPUT

Coaxial connector, output from transceiver or exciter plugs into this connector.

P.A. BIAS

Sets idling current for 5894B amplifier tube. (60 ma.)

OUTPUT

Coaxial connector, output from amplifier into antenna.

GND

Connection for grounding chassis of VHF-150.

OPERATION

Before connecting any cables to the Swan VHF-150, perform the following steps:

- ① **IMPORTANT:** Locate the 5894B amplifier tube compartment and remove the packing material from the tube.
- ② Turn PWR ON switch located on front panel to "OFF" (Down) position.
- ③ Rotate BYPASS TUNE-CW-FM SSB function switch to the BYPASS position.
- ④ Rotate OUTPUT METERING switch to CATHODE CURRENT position (Full counterclockwise position until switch snaps).
- ⑤ Connect wire from earth ground to ground stud provided on rear of chassis.
- ⑥ Connect the 117 VAC or 230 VAC power supply cable to the 15 pin connector on rear of chassis. If amplifier is to be used mobile, connect the Swan model 14C DC converter to the 15 pin connector.

AMPLIFIER TUNING

- ① Connect amplifier to antenna or dummy load.
- ② Connect relay control cable from Swan FM-2X transceiver to RELAY CONTROL phone jack on rear of chassis.
- ③ Connect output from Swan FM-2X transceiver to INPUT connector on rear of VHF-150 chassis.
- ④ Connect power cable to 117 volts AC (230 volts AC if VHF-150 is wired for 230 volts). If using Mobile, connect amplifier to 12 VDC. (See Figure 4.)
- ⑤ Turn PWR ON switch to "ON" (up) position. Indicator light located below meter will come on.
- ⑥ Allow 2 minutes for warmup of amplifier.
- ⑦ Place the channel switch on the Swan FM-2X to a channel that does not have a crystal installed, or disconnect the coaxial cable between the output of the FM-2X and the input to the VHF-150.
- ⑧ Place the BYPASS TURN-CW-FM SSB function switch in the SSB position.
- ⑨ Depress the mike switch on the FM-2X microphone, and adjust the P.A. BIAS control on the rear of the amplifier until the meter reads 60 ma. of cathode current. Release mike switch.
- ⑩ Place channel switch on FM-2X to a channel that has a crystal installed, or reconnect coaxial cable between output of FM-2X and input of VHF-150.
- ⑪ Set LOAD control to 0 (minimum position).
- ⑫ Set DRIVE control to position No. 5.
- ⑬ Place BYPASS TUNE-CW-FM SSB function switch in the TUNE-CW-FM position.
- ⑭ Depress mike switch and adjust GRID control for MAXIMUM reading on the meter.

CAUTION

DO NOT HOLD MIKE SWITCH DEPRESSED MORE THAN 5 SECONDS AT THIS TIME. PLATE CIRCUIT IS NOT AT RESONANCE YET AND 5894B AMPLIFIER TUBE WILL DRAW EXCESSIVE CURRENT.

- ⑮ Again depress mike switch, and rapidly tune PLATE control for a "DIP" on the meter. This action is known as "resonating" the plate circuit, and is extremely vital to preserving tube life.

NOTE

IF YOU HAVE NOT FOUND THE "DIP" IN 5 SECONDS, RELEASE THE MIKE SWITCH AND WAIT 30 SECONDS BEFORE TRYING AGAIN.

- ⑯ Continue tuning the GRID and PLATE controls until the meter reads Maximum for the GRID control and Minimum ("DIP") for the PLATE control.
- ⑰ Set DRIVE control to position No. 3.
- ⑱ Rotate OUTPUT METERING control fully clockwise.
- ⑲ Depress mike switch and advance the LOAD control to approximately 5. This should cause an increase in meter reading. Alternately adjust LOAD and PLATE controls until a maximum reading is obtained on the meter. If meter pegs, rotate meter control counterclockwise until a lower level on the meter is obtained.
- ⑳ Rotate OUTPUT METERING control to CATHODE CURRENT position (switch snaps). Depress mike switch and check plate tuning for a "DIP". If meter is on the "DIP" or only slightly off, leave on "DIP". The amplifier should be drawing approximately 180 to 200 ma. of cathode current. If a large adjustment is necessary to "DIP" the meter, improper tuning of the VHF-150, or a high VSWR in the antenna is indicated.
- ㉑ Rotate OUTPUT METERING switch clockwise to Relative Output.
- ㉒ Normally, the VHF-150 should have the DRIVE control set at position No. 3 when used with the Swan FM-2X. Position No. 1 and No. 2 will give excessive drive which causes harmonics and other spurious outputs. In cases where the FM-2X has exceptionally good output, (12 to 13 watts), position No. 4 may be used. When using the VHF-150 with other equipment, the position of the DRIVE control will vary depending upon the drive available. Use the position on the DRIVE control that just gives you full output. Advancing it farther to squeeze out an extra watt or two only gives you stronger spurious signal possibilities, without really gaining anything at the receiving end.
- ㉓ The VHF-150 is now properly tuned and ready for ON-THE-AIR operation. Select the proper mode of operation for your particular exciter or transceiver. For the Swan FM-2X transceiver, set the BYPASS TUNE-CW-FM SSB function switch in the TUNE-CW-FM position. Do not attempt to transmit CW or FM with the function switch in the SSB position. While SSB will operate in the TUNE-CW-FM position, linear operation is not possible, and distortion of the SSB signal will take place.

SSB OPERATION

The tuning procedure for SSB operation is the same as previously described. The idling current will be 60 ma. whenever the mike switch is depressed, and the BYPASS TUNE-CW-FM SSB function switch is in the SSB position. This allows the amplifier to operate linear. During voice modulation, the plate current should average about 125 ma. on voice peaks. Actually, the plate current will be approximately 180 to 200 ma., but due to meter damping, will indicate an average of about 125 ma.

CW OPERATION

The tuning procedure for CW operation is the same as previously described. Rotating the BYPASS TUNE-CW-FM

SSB function switch to the TUNE-CW-FM position biases the 5894B tube to cutoff for Class C operation. Plate current during steady tone key down operation should be approximately 180 to 200 ma.

WARNING

DANGEROUS VOLTAGES EXIST IN THE P.A. ENCLOSURE, AND ALSO UNDER THE CHASSIS ON THE DIODE AND CAPACITOR MOUNTING BOARDS. BEFORE WORKING ON AMPLIFIER, BE SURE TO WAIT 5 MINUTES, OR GROUND THE 800 VOLTS DC LINE UNDER THE CHASSIS AT THE CAPACITOR BOARD, AFTER REMOVING AC OR DC INPUT VOLTAGES.

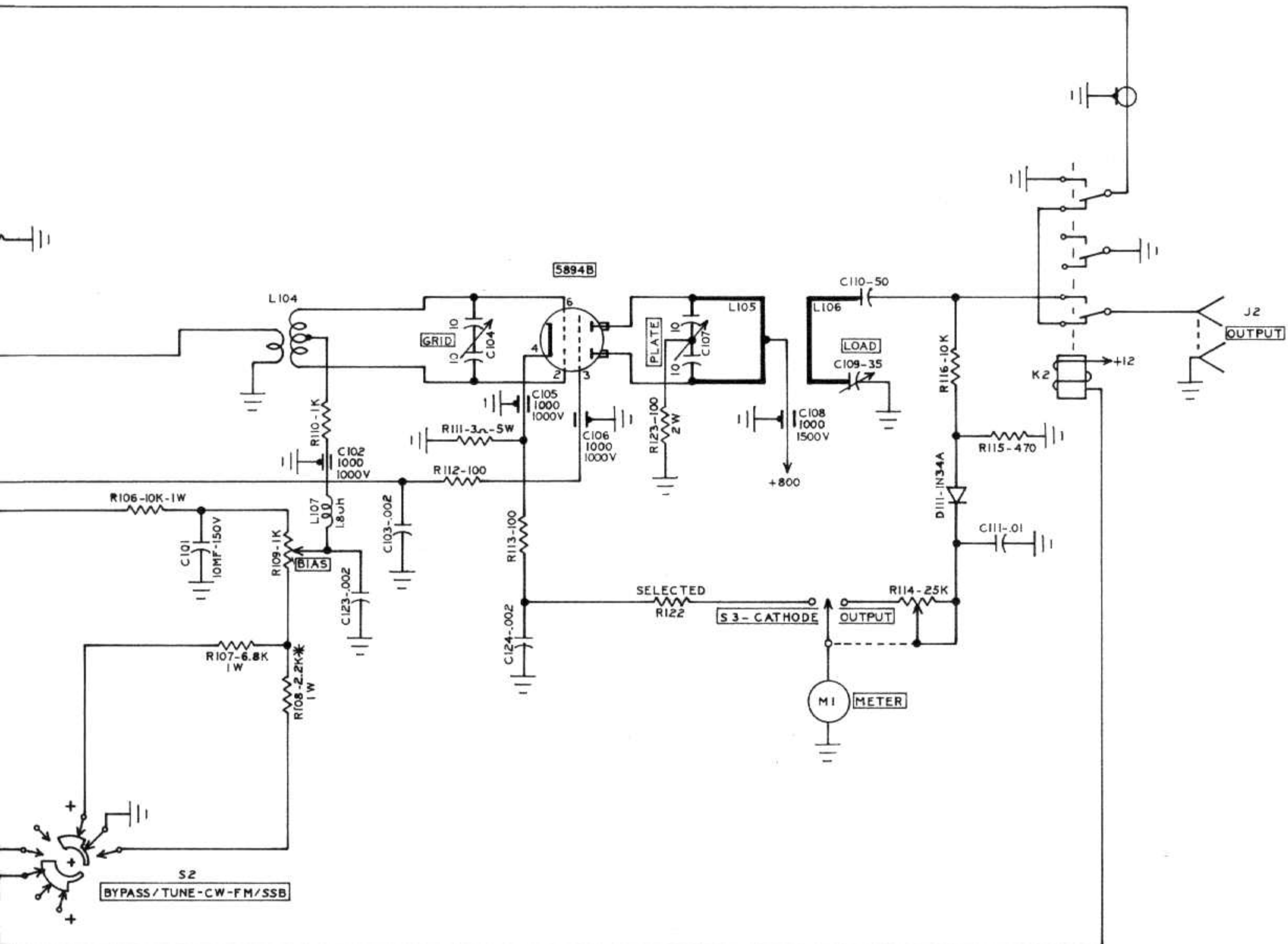
MAINTENANCE

There will be little maintenance required in the VHF-150 amplifier. The 5894B tube will provide thousands of service hours when operated according to instructions. Deterioration of a tube will generally be indicated by a change in idling current or inability to draw normal plate current, or both. However, except for occasional field problems which may occur with any electronic device, the tube may be expected to operate month after month and year after year with no problems.

Other components are also operating conservatively, and well within nominal ratings. The electrolytic filter capacitors in the power supply are computer grade, meaning that they have a much higher degree of purity and quality control than conventional types. Life expectancy of these filters is approximately 10 years. The silicon diodes used in the power supply are hermetically sealed and are not likely to even fail or wear out.

PARTS LIST

<u>REF NR.</u>	<u>DESCRIPTION</u>	<u>PART NR.</u>	<u>REF NR.</u>	<u>DESCRIPTION</u>	<u>PART NR.</u>
LAMPS			COILS/CHOKES (Continued)		
B1	Pilot Lamp	471-005	L105	Plate Coil	
CAPACITORS			L106	Antenna Pickup Coil	
C101	10 mf 150V	073-011	L107	1.8uh Bias Choke	027-018
C102	1000 Pf 1000V	077-001	METERS		
C103	.002 mf	072-018	M1	Cathode Current and Relative Output Meter	112-022
C104	2 x 10 Pf	074-031	PLUGS		
C105	1000 Pf 1000V	077-001	P1	15 Pin power plug Male	344-017
C106	1000 Pf 1000V	077-001	RESISTORS		
C107	2 x 10 Pf	074-031	All resistors are 1/2 Watt 10% tolerance, unless otherwise noted.		
C108	1000 Pf 1500V	077-002	R101	10 ohm 1W	043-100
C109	35 Pf	074-032	R102	10 ohm 1W	043-100
C110	50 Pf	084-013	R103	10 ohm 1W	043-100
C113	.01 mf	072-023	R104	10 ohm 1W	043-100
C112	.002 mf	072-018	R105	10 ohm 1W	043-100
C113	250 mf 25V	073-006	R106	10K 1W	043-103
C114	100 mf 350V	073-046	R107	6.8K 1W	043-682
C115	100 mf 350V	073-046	R108	2.2K 1W	143-222
C116	100 mf 350V	073-046	R109	1K pot	052-014
C117	150 mf 150V	073-043	R110	1K	042-102
C118	.0047 mf 1000V	085-012	R111	3 ohm 5W WW	049-039
C119	.0047 mf 1000V	085-012	R112	100 ohm	042-101
C120	100 mf 350V	073-046	R113	100 ohm	042-101
C121	.002 mf	072-018	R114	25K pot W/SPDT switch (S3)	052-037
C122	.002 mf	072-018	R115	470 ohm	042-471
C123	.002 mf	072-018	R116	10K	042-103
C124	.002 mf	072-018	R117	4.7 ohm	042-478
DIODES			R118	150K 2W	044-154
D101-110	.750 Amp 600V	475-018	R119	150K 2W	044-154
D111	1N34A	475-008	R120	2K 20W WW	049-035
FUSES			R121	150K 2W	044-154
F1	3AB-6A	482-013	R122	Selected Value	
F2	3AB-3A		R123	100 ohm 2W	044-101
JACKS			SWITCHES		
J1	Input Recpt	344-015	S1	Drive Control	171-031
J2	Output Recpt	344-015	S2	BYPASS/TUNE-CW-FM/SSB Function Switch	171-115
J3	Relay Control	342-008	S3	OUTPUT METERING SWITCH PART OF R114	
J4	15 pin Power Conn. Female	344-016	S4	PWR ON	172-005
J5	15 pin Power Conn. Female	344-016	TRANSFORMER		
RELAYS			T101	Power Transformer	271-007
K1	Input relay	111-015	X1	117 VAC Cord Assy	500-103
K2	Output relay	111-015	X2	230 VAC Cord Assy	500-104
COILS/CHOKES					
L101	1.8uh Fil. Choke	027-018			
L102	17uh HV Choke	027-005			
L103	1.5 Hy Filter	274-001			
L104	Grid Tuning/Coupling				



SCHEMATIC DIAGRAM, SWAN MODEL VHF-150 AMPLIFIER
SWAN ELECTRONICS, Oceanside, California